

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1-4. (Canceled)

1 5. (Currently amended): A method for writing data to a cache memory ~~by a~~
2 ~~channel control unit for the case where wherein~~ a data write-in request is issued from an
3 information processor to a storage control apparatus, the storage control apparatus including a
4 plurality of ~~the~~ channel control units each having an interface with the information processor; a
5 disk control unit having an interface with a storage device for storing data; ~~the a~~ cache memory
6 disposed in each channel control unit for temporarily storing temporarily data to be interchanged
7 between the information processor and the storage device, ~~the cache memory being disposed in~~
8 ~~each of the plurality of channel control units that are connected to one another through;~~ a
9 dedicated data transfer path between at least two cache memories used for storing mutually the
10 data temporarily stored; and an internal a connector unit for connecting mutually to provide data
11 paths among the plurality of channel control units and the disk control unit separate from the
12 dedicated data transfer path, comprising:

13 receiving data to be written from the information processor;
14 writing the data to be written to the cache memory of a first channel control unit;
15 transmitting the data to be written through the dedicated data transfer path to the
16 ~~other~~ a second channel control unit connected to the first channel control unit ~~each other through~~
17 ~~the dedicated data transfer path;~~
18 receiving through the dedicated data transfer path an acknowledgement ~~notifying~~
19 indicating that writing of the transmitted data to the cache memory disposed in the ~~other~~ second
20 channel control unit has ~~been completed, from the other channel control unit;~~ and
21 transmitting the acknowledgement to the information processor to notify the
22 information processor that data written to the cache memory of the second channel control unit

23 ~~has completed notifying that writing to the cache memory of the data to be written has been~~
24 ~~completed, to the information processor.~~

1 6. (Currently amended): A method in a storage control apparatus for reading
2 in data stored in a second cache memory to a first cache memory ~~by a channel control unit in a~~
3 storage control apparatus, the storage control apparatus including a plurality of ~~the~~ channel
4 control units each having an interface with an information processor; a disk control unit having
5 an interface with a storage device for storing data; ~~the first cache memory~~ a plurality of first
6 cache memories each disposed in one of the channel control units for temporarily storing
7 temporarily data to be interchanged between the information processor and the storage device,
8 the first cache memory of at least two of the channel control units being disposed in each of the
9 plurality of channel control units that are connected to one another through a dedicated data
10 transfer path; used for storing mutually the data temporarily stored; a couple of the second cache
11 memories for storing the same data mutually; and an internal a connector unit for connecting
12 mutually to provide data paths among the plurality of channel control units~~[,]~~ and the disk
13 control unit separate from the dedicated data transfer path~~and the couple of second cache~~
14 memories, comprising:

15 transmitting a read-in-read-out command of the data to the second cache memory;
16 acquiring the data from the second cache memory;

17 writing the acquired data to the first cache memory of a first channel control unit;

18 transmitting the acquired data through the dedicated data transfer path to the
19 other a second channel control unit connected to the first channel control unit each other through
20 the dedicated data transfer path; and

21 receiving an acknowledgement from the second channel control unit indicating
22 that the acquired data has been written to the first cache memory of the second channel control
23 unit notifying that the writing of the transmitted data to the cache memory disposed in the other
24 channel control unit has been completed, from the other channel control unit.

1 7. (Currently amended): A method performed by a channel control unit for
2 reading out data ~~by a channel control unit for the case where~~wherein a data read-out request is
3 issued from an information processor to a storage control apparatus, the storage control apparatus
4 including a plurality of ~~the~~channel control units each having an interface with the information
5 processor; a disk control unit having an interface with a storage device for storing data; a first
6 cache memory in each of the channel control units for temporarily storing temporarily data, to be
7 interchanged between the information processor and the storage device, the first cache memory
8 of at least two of the channel control units being disposed in each of the plurality of channel
9 control units connected to one another through a dedicated data transfer path ~~used for storing~~
10 ~~mutually the data temporarily stored~~; a couple plurality of second cache memories ~~for storing the~~
11 ~~same data mutually~~; and ~~an internal~~ a connector unit to provide data paths among ~~for connecting~~
12 ~~mutually~~ the plurality of channel control units~~[],]~~ and the disk control unit separate from the
13 dedicated data transfer path~~and the couple of second cache memories~~, comprising:
14 receiving from the information processor a read-out command for data for which
15 ~~the~~an address is specified;
16 determining whether the data at the specified address is stored in the first cache
17 memory of a first channel control unit;
18 transmitting a ~~read-in~~ read-out command of the data to one of the second cache
19 memory memories if the data at the specified address is not stored in the first cache memory of
20 the first channel control unit;
21 acquiring the data from the second cache memory;
22 writing the acquired data to the first cache memory of the first channel control
23 unit;
24 transmitting the acquired data through the dedicated data transfer path to ~~the~~
25 ~~other~~a second channel control unit connected to the first channel control unit~~each other~~ through
26 ~~the dedicated data transfer path~~;

27 receiving from the ~~other~~second channel control unit an acknowledgement
28 ~~notifying~~indicating that writing of the ~~transmitted~~acquired data to the first cache memory
29 disposed in the other ~~channel~~second control unit has ~~been~~ completed; and
30 transmitting the acquired data to the information processor.

8-11. (Canceled)

1 12. (Currently amended): A channel control unit in a storage control
2 apparatus including a plurality of ~~the~~ channel control units each having an interface with ~~the~~an
3 information processor; a disk control unit having an interface with a storage device for storing
4 data; a first cache memory in each channel control unit for temporarily storing temporarily data
5 to be interchanged between the information processor and the storage device, the first cache
6 memory of at least two of the channel control units being ~~disposed in each of the plurality of~~
7 ~~channel control unit~~ connected to one another by a dedicated data transfer path used for storing
8 mutually the ~~data~~ temporarily stored data; a ~~couple of~~ second cache memorymemories for storing
9 ~~the same data mutually~~; and ~~an internal~~ a connector unit to provide data paths among ~~for~~
10 ~~connecting~~ mutually the plurality of channel control units, the disk control unit and the ~~couple of~~
11 second cache memories separate from the dedicated data transfer path, the channel control unit
12 comprising:

13 a transmitter for transmitting to the second cache memory a ~~read-in~~read-out
14 command for data stored in the second cache memory;
15 an acquiring portion for acquiring the data from the second cache memory;
16 a writing portion for writing the acquired data to the first cache memory of the
17 channel control unit;
18 a transmitter for transmitting the acquired data through the dedicated data transfer
19 path to ~~the other~~another channel control unit connected to the channel control unit ~~each other~~
20 ~~through the dedicated data transfer path~~; and
21 a receiver for receiving from the other channel control unit an acknowledgement
22 notifying that the writing of the transmitted data to the first cache memory disposed in the other
23 channel control unit has ~~been~~ completed.

1 13. (Currently amended): A channel control unit in a storage control
2 apparatus including a plurality of ~~the~~ channel control units each having an interface with an
3 information processor; a disk control unit having an interface with a storage device for storing
4 data; a first cache memory in each channel control unit for temporarily storing ~~temporarily~~ data
5 to be interchanged between the information processor and the storage device, the first cache
6 memory of at least two of the channel control units being ~~disposed in each of the plurality of~~
7 ~~channel control units~~ connected to one another through a dedicated data transfer path ~~used for~~
8 ~~storing mutually the data temporarily stored; at least one second cache memory a couple of~~
9 ~~second cache memories for storing the same data mutually; and an internal~~ connector unit to
10 provide data paths among ~~for connecting~~ mutually the plurality of channel control units, the disk
11 control unit and the at least one second cache memory ~~separate from the dedicated data transfer~~
12 ~~path couple of second cache memories~~, the channel control unit comprising:

13 a receiver for receiving from the information processor a read-out command for
14 data for which the address is specified;

15 a determining portion for determining whether the data at the specified address is
16 stored in the first cache memory of the channel control unit;

17 a transmitter for transmitting the ~~read-in~~ read-out command for the data to the at
18 least one second cache memory if the data at the specified address is not stored in the first cache
19 memory;

20 an acquiring portion for acquiring the data from the at least one second cache
21 memory;

22 a writing portion for writing the acquired data to the first cache memory of the
23 channel control unit;

24 a transmitter for transmitting the acquired data through the dedicated data transfer
25 path to ~~the other~~ another channel control unit connected to the channel control unit ~~each other~~
26 ~~through the dedicated data transfer path~~;

27 a receiver for receiving from the other[-] channel control unit an
28 acknowledgement ~~notifying-indicating~~ that the writing of the ~~transmitted-acquired~~ data to the
29 first cache memory disposed in the other channel control unit has ~~been~~-completed; and
30 a transmitter for transmitting the acquired data to the information processor.

14-16. (Canceled)

1 17. (Currently amended): A computer-readable medium containing a
2 computer program executed on a first channel control unit in a storage control apparatus
3 including a plurality of ~~the~~ channel control units each having an interface with the information
4 processor; a disk control unit having an interface with a storage device for storing data; a cache
5 memory in each channel unit for temporarily storing ~~temporarily~~ data to be interchanged
6 between the information processor and the storage device, the cache memory of at least two
7 ~~being disposed in each~~ of the plurality of channel control units being connected to one another
8 through a dedicated data transfer path used for storing mutually the ~~data-temporarily stored~~ data;
9 and ~~an internal~~ a connector unit to provide data paths among ~~for connecting~~ mutually the
10 plurality of channel control units and the disk control unit separate from the dedicated data
11 transfer path, the computer program configured to cause the first channel control unit to perform
12 steps comprising:

13 receiving data to be written from the information processor;
14 writing the data to be written to the cache memory of the first channel control
15 unit;

16 transmitting the data to be written through the dedicated data transfer path to the
17 ~~other~~a second channel control unit connected to ~~each other~~the first channel control unit through
18 ~~the dedicated data transfer path~~;

19 receiving from the ~~other~~second channel control unit through the dedicated data
20 transfer path an acknowledgement ~~notifying-indicating~~ that the writing of the ~~transmitted~~ data to
21 the cache memory disposed in the ~~other~~second channel control unit has ~~been~~-completed; and

22 transmitting the acknowledgement to the information processor ~~an~~
23 ~~acknowledgement notifying that the writing to the cache memory of the data to be written has~~
24 ~~been completed.~~

1 18. (Currently amended): A computer-readable medium containing a
2 computer program executed on a first channel control unit in a storage control apparatus
3 including a plurality of ~~the~~ channel control units each having an interface with an information
4 processor; a disk control unit having an interface with a storage device for storing data; a first
5 cache memory in each channel unit for temporarily storing temporarily data to be interchanged
6 between the information processor and the storage device, the first cache memory of at least two
7 ~~being disposed in each of the plurality of channel control units being~~ connected to one another
8 through a dedicated data transfer path used ~~for storing mutually the data temporarily stored;~~ a
9 ~~couple of at least two second cache memories for storing the same data mutually; and an internal~~
10 a connector unit to provide data paths among for connecting mutually the plurality of channel
11 control units, the disk control unit and the couple of at least two second cache memories separate
12 from the dedicated data transfer path, the computer program configured to cause the first channel
13 control unit to perform steps comprising:

14 transmitting to ~~the second cache memory~~ one of the second cache memories a
15 ~~read-in~~read-out command for data stored ~~therein~~ the second cache memory;

16 acquiring the data from the one of the second cache memories ~~second cache~~
17 ~~memory;~~

18 writing the acquired data to the first cache memory of the first channel control
19 unit;

20 transmitting the acquired data through the dedicated data transfer path to the
21 ~~other~~ second channel control unit connected to the first channel control unit ~~each other~~ through
22 ~~the dedicated data transfer path~~; and

23 receiving from the ~~other~~ second channel control unit an acknowledgement
24 ~~notifying indicating that the writing of the transmitted acquired data to the first cache memory~~
25 ~~disposed in the other second channel control unit has been completed.~~

1 19. (Currently amended): A computer-readable medium containing a
2 computer program executed on a first channel control unit in a storage control apparatus
3 including a plurality of channel control units each having an interface with an information
4 processor; a disk control unit having an interface with a storage device for storing data; a first
5 cache memory in each channel unit for temporarily storing temporarily data to be interchanged
6 between the information processor and the storage device, the first cache memory of at least two
7 ~~being disposed in each of the plurality of channel control units~~ being connected to one another
8 through a dedicated data transfer path used for storing mutually the ~~data-temporarily stored data~~;
9 ~~a couple of~~ at least two second cache memories ~~for storing the same data mutually~~; and ~~an~~
10 ~~internal~~ a connector unit to provide data paths among ~~for connecting mutually~~ the plurality of
11 channel control units, the disk control unit and the ~~couple of~~ second cache memories separate
12 from the dedicated data transfer path, the computer program configured to cause the first channel
13 control unit to perform steps comprising:

14 receiving from the information processor a read-out command for data for which
15 the address is specified;

16 determining whether the data at the specified address is stored in the first cache
17 memory of the first channel control unit;

18 transmitting a ~~read in~~read-out command for the data at the specified address to ~~the~~
19 ~~first cache memory~~ one of the second cache memories if the data is not stored in the first cache
20 memory;

21 acquiring the data from the one of the second cache memories ~~second cache~~
22 ~~memory~~;

23 writing the acquired data to the first cache memory;

24 transmitting the acquired data through the dedicated data transfer path to ~~the~~
25 ~~other~~ a second channel control unit connected to the first channel control unit ~~each other~~ through
26 ~~the dedicated data transfer path~~;

27 receiving from the ~~other~~second channel control unit an acknowledgement
28 ~~notifying-indicating~~ that the writing of the ~~transmitted~~acquired data to the first cache memory
29 disposed in the ~~other~~second channel control unit has ~~been~~ completed; and
30 transmitting the acquired data to the information processor.

20-22. (Canceled)